ing code official to determine the character, quality and limitations of application of the materials.

1506.5 Nails. Nails shall be corrosion-resistant nails conforming to ASTM F1667 or an equal corrosion resistance by coating, electro galvanization, mechanical galvanization, hot-dipped galvanization, stainless steel, nonferrous metal and alloys or other suitable corrosion-resistant material, or corrosion resistance shall be demonstrated in accordance with TAS114, Appendix E.

1506.6 Screws. Wood screws conform to ANSI/ASME B18.6.1. Screws shall be corrosion resistant by coating, galvanization, stainless steel, nonferrous metal or other suitable corrosion-resistant material. The corrosion resistance shall be demonstrated through one of the following methods:

1. Corrosion resistance equivalent to ASTM A641, Class 1;
2. Corrosion resistance in accordance with TAS114, Appendix E; or
3. Corrosion-resistant coating exhibiting not more than 5 percent red rust after 1000 hours exposure in accordance with ASTM B117.

1506.7 Clips. Clips shall be corrosion-resistant clips. The corrosion resistance shall meet 0.90 ounce per square foot (0.458 kg/m^2) measured according to ASTM A90/A90M, TAS 114, Appendix E or an equal corrosion-resistance coating, electro galvanization, mechanical galvanization, hot dipped galvanization, stainless steel, nonferrous metals and alloys or other suitable corrosion-resistant material. Stainless steel clips shall conform to ASTM A240/A240M, Type 304.

SECTION 1507
REQUIREMENTS FOR ROOF COVERINGS

1507.1 Scope. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

1507.1.1 Underlayment. Unless otherwise noted, underlayment for asphalt shingles, metal roof panels, metal roof shingles, mineral surfaced roll roofing, slate shingles, wood shingles, and wood shakes shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D226, D1970, D4869 and D6757 shall bear a label indicating compliance to the standard designation and, if applicable, type classification indicated in Table 1507.1.1. Underlayment shall be applied and attached in accordance with Table 1507.1.1.

Exception: A reinforced synthetic underlayment that is approved as an alternative to underlayment complying with ASTM D226 Type II and having a minimum tear strength per ASTM D1970 or ASTM D4533 of 20 pounds (9.1 kg) shall be permitted. This underlayment shall be installed and attached in accordance with the underlayment attachment methods of Table 1507.1.1 for the applicable roof covering and slope, except metal cap nails shall be required where the ultimate design wind speed, V_{ult}, equals or exceeds 150 mph.

1507.2 Asphalt shingles. The installation of asphalt shingles shall comply with the provisions of this section. or RAS 115.

1507.2.1 Deck requirements. Asphalt shingles shall be fastened to solidly sheathed decks.

1507.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (17-percent slope) or greater. For roof slopes from two units vertical in 12 units horizontal (17-percent slope) up to four units vertical in 12 units horizontal (33-percent slope), double underlayment application is required in accordance with Section 1507.2.8.

1507.2.3 Underlayment. Underlayment shall comply and be installed in accordance with Section 1507.1.1.

1507.2.4 Self-adhering polymer modified bitumen sheet. Self-adhering polymer modified bitumen sheet shall comply with ASTM D1970.

1507.2.5 Asphalt shingles. Asphalt shingles shall have self-seal strips or be interlocking and comply with ASTM D225 or ASTM D3462. Shingles shall also comply with Table 1507.2.7.1. Asphalt shingle packaging shall bear labeling indicating compliance with one of the required classifications as shown in Table 1507.2.7.1.

1507.2.6 Fasteners. Fasteners for asphalt shingles shall be galvanized, stainless steel, aluminum or copper roofing nails, minimum 12-gage [0.105 inch (2.67 mm)] shank with a minimum $^3/_8$-inch-diameter (9.5 mm) head, of a length to penetrate through the roofing materials and a minimum of $^3/_4$ inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than $^3/_4$ inch (19.1 mm) thick, the nails shall penetrate through the sheathing. Fasteners shall comply with ASTM F1667.

1507.2.6.1 The nail component of plastic cap nails shall meet the corrosion-resistance requirements of Section 1506.5.

1507.2.7 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer and Section 1504.1. Asphalt shingles shall be secured to the roof with not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds 21 units vertical in 12 units horizontal (21:12), asphalt shingles shall be installed in accordance with the manufacturer's printed installation instructions for steep-slope roof applications.

1507.2.7.1 Wind resistance of asphalt shingles. Asphalt shingles shall be classified in accordance with

Note: What is commonly called 15# felt is ASTM D4869, Type II or ASTM D226, Type I. Commonly called 30# would be ASTM D4869, Type IV or ASTM D226, Type II.

TABLE 1507.1.1
UNDERLAYMENT TABLE

Roof Covering Section	Roof Slope 2:12 and Less Than 4:12 Underlayment	Underlayment Attachment[a]	Roof Slope 4:12 and Greater Underlayment	Underlayment Attachment[a]
Asphalt shingles 1507.2	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3
Concrete and Clay Tile 1507.3	See Section 1507.3.3			
Metal roof panels 1507.4	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3
Metal roof shingles roofing 1507.5	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3
Mineral-surfaced roll roofing 1507.6	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3
Slate shingles 1507.7	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3
Wood shingles 1507.8	ASTM D226 Type I or II ASTM D4869 Type II, III or IV	1	ASTM D226 Type II ASTM D4869 Type IV	2
Wood shakes 1507.9		Limited to roof slopes 4:12 and Greater	ASTM D226 Type II ASTM D4869 Type IV	2
Photovoltaic Shingles 1507.17	ASTM D226 Type I or II ASTM D4869 Type II, III or IV ASTM D6757	1	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757	2
	ASTM D1970	3	ASTM D1970	3

[a]Underlayment Attachment

1. Roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), end laps shall be 6 inches and shall be offset by 6 feet. The underlayment shall be attached to a nailable deck with corrosion-resistant fasteners with one row centered in the field of the sheet with a maximum fastener spacing of 12 inches (305 mm) o.c., and one row at the end and side laps fastened 6 inches (152 mm) o.c. Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing.
2. Roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 4 inches (51 mm), end laps shall be 6 inches and shall be offset by 6 feet. The underlayment shall be attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 inches (305 mm) o.c., and one row at the end and side laps fastened 6 inches (152 mm) o.c. Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing.
3. Roof slopes from two units vertical in 12 units horizontal (17-percent slope), and greater. The entire roof deck shall be covered with an approved self-adhering polymer modified bitumen underlayment complying with ASTM D1970 installed in accordance with both the underlayment manufacturer's and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed.

   Exception: A minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D1970, installed in accordance with the manufacturer's instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment in accordance with Table 1507.1.1 for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide (102 mm) membrane strips.

ASTM D3161, ASTM D7158 or TAS 107. Shingles classified as ASTM D3161 Class D or ASTM D7158 Class G are acceptable for use where V_{asd} is equal to or less than 100 mph. Shingles classified as ASTM D3161 Class F, ASTM D7158 Class H or TAS 107 are acceptable for use for all wind speeds. Asphalt shingle wrappers shall indicate compliance with one of the required classifications, as shown in Table 1507.2.7.1.

TABLE 1507.2.7.1
CLASSIFICATION OF ASPHALT SHINGLES

MAXIMUM BASIC WIND SPEED FROM FIGURE 1609A, B, C or ASCE-7	V_{asd}	ASTM D7158	ASTM D3161
110	85	D, G or H	D or F
116	90	D, G or H	D or F
129	100	G or H	D or F
142	110	G or H	F
155	120	G or H	F
168	130	H	F
181	140	H	F
194	150	H	F

1507.2.8 Underlayment application. Underlayment shall comply with Section 1507.1.1.

1507.2.8.1 High wind attachment. Reserved.

1507.2.8.2 Ice barrier. Reserved.

1507.2.9 Flashings. Flashing for asphalt shingles shall comply with this section or RAS 111. Flashing shall be applied in accordance with this section, the asphalt shingle manufacturer's printed instructions or RAS 111.

1507.2.9.1 Base and counter flashing. Base and counter flashing shall be installed as follows:

1. In accordance with manufacturer's installation instructions, or
2. In compliance with RAS-111, or
3. A continuous metal minimum 4 inches by 4 inches "L" flashing shall be set in approved flashing cement and set flush to the base of the wall and over the underlayment. Both horizontal and vertical metal flanges shall be fastened 6 inches (152 mm) on center with approved fasteners. All laps shall be a minimum of 4 inches (102 mm) fully sealed in approved flashing cement. Flashing shall start at the lower portion of roof to insure water-shedding capabilities of all metal laps. The entire edge of the horizontal flange shall be sealed covering all nail penetrations with approved flashing cement and membrane. Shingles will overlap the horizontal flange and shall be set in approved flashing cement.

Base flashing shall be of either corrosion-resistant metal with a minimum thickness provided in Table 1503.2 or mineral surface roll roofing weighing a minimum of 77 pounds per 100 square feet (3.76 kg/m^2). Counter flashing shall be corrosion-resistant metal with a minimum thickness provided in Table 1503.2.

1507.2.9.2 Valleys. Valley linings shall be installed in accordance with the manufacturer's instructions before applying shingles. Valley linings of the following types shall be permitted:

1. For open valleys (valley lining exposed) lined with metal, the valley lining shall be at least 16 inches (406 mm) wide and of any of the corrosion-resistant metals in Table 1503.2.
2. For open valleys, valley lining of two plies of mineral-surfaced roll roofing complying with ASTM D3909 or ASTM D6380 Class M-03 shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys (valleys covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D6380 Class S-03, and at least 36 inches (914 mm) wide or types as described in Item 1 or 2 above shall be permitted. Self-adhering polymer modified bitumen underlayment complying with ASTM D1970 shall be permitted in lieu of the lining material.

Table1507.2.9.2 Valley Lining Material. Reserved.

1507.2.9.3 Drip edge. Provide drip edge at eaves and gables of shingle roofs. Overlap to be a minimum of 3 inches (76 mm). Eave drip edges shall extend $^1/_2$ inch (13 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 4 inches (51 mm) width of roof cement installed over the drip edge flange. Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Where the V_{asd}, as determined in accordance with Section 1609.3.1, is 110 mph (177 km/h) or greater or the mean roof height exceeds 33 feet (10 058 mm), drip edges shall be mechanically fastened a maximum of 4 inches (102 mm) on center.

1507.3 Clay and concrete tile. The installation of clay and concrete tile shall comply with the provisions of this section.

1507.3.1 Deck requirements. Concrete and clay tile shall be installed only over solid sheathing except where the roof covering is specifically designed and tested in accor-

For Bay County, shingles should be ASTM D7158 class G or H or ASTM D3161 Class F